

DRAWING LEGEND

[Fig.1]

A1: position reference  
A2: speed reference  
A3: predicted disturbance torque (thrust)  
A4: torque (thrust) reference  
A5: new torque (thrust) reference  
A6: speed of motor

[Fig.2]

A1: new torque (thrust) reference  
A2: speed of motor  
A3: predicted disturbance torque (thrust)

[Fig.3]

A1: new torque (thrust) reference  
A2: speed of motor  
A3: predicted disturbance torque (thrust)

[Fig.4]

A1: new torque (thrust) reference  
A2: speed of motor  
A3: predicted disturbance torque (thrust)

[Fig.5]

A1: speed reference

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[Fig.6]

A1: position reference speed

[Fig.7]

A1: position deviation moment of inertia ratio 0[%]

A2: position deviation moment of inertia ratio 1500[%]

A3: set correct moment of inertia ratio

[Fig.8]

(a)

13: inertia variation restraining means

A1: position reference

A2: speed reference

A3: torque (thrust) reference

A4: predicted disturbance torque (thrust)

A5: new torque (thrust) reference

A6: speed of motor

(b)

A1: torque (thrust) reference

A2: speed of motor

A3: predicted speed of motor

[Fig.9]

A1: position deviation moment of inertia ratio 0[%]

A2: position deviation moment of inertia ratio 2500[%]

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A3: set correct moment of inertia ratio

[Fig.10]

A1: add low pass filter to Embodiment 2

A2: set correct moment of inertia ratio

[Fig.11]

A1: position reference

A2: speed reference

A3: torque (thrust) reference

A4: new torque (thrust) reference

A5: predicted disturbance torque (thrust)

A6: speed of motor

[Fig.13]

A1: speed loop gain  $K_v$

A2: LPF time constant of speed observer

[Fig.14]

A1: speed loop gain  $K_v$

A2: LPF time constant of speed observer

[Fig.15]

(a)

A1: position reference

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A2: speed reference

A3: speed of motor

A4: torque (thrust) reference

(b)

A1: speed reference

A2: torque (thrust) reference

[Fig.16]

A1: position reference

A2: speed reference

A3: predicted disturbance torque (thrust)

A4: torque (thrust) reference

A5: new torque (thrust) reference

A6: speed of motor

[Fig.17]

A1: position reference speed

(a) speed of motor (moment of inertia ratio 0[%])

(b) speed of motor (moment of inertia ratio 1000[%])

(c) speed of motor (moment of inertia ratio 2500[%])

[Fig.18]

A1: speed loop gain  $K_v$

A2: low pass filter cut off frequency of phase advancing filter

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[Fig.19]

A1: speed loop gain  $K_v$

A2: low pass filter cut off frequency of phase advancing filter

[Fig.20]

A1: position reference

A2: speed reference

A3: torque (thrust) reference

A4: new torque (thrust) reference

A5: predicted disturbance torque (thrust)

A6: speed of motor

[Fig.21]

A1: position reference speed

A2: moment of inertia ratio = 0 %

A3: moment of inertia ratio = 1000 %

A4: moment of inertia ratio = 200 %

[Fig.22]

A1: position reference

A2: speed reference

A3: torque (thrust) reference

A4: new torque (thrust) reference

A5: predicted disturbance torque (thrust)

A6: speed of motor

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[Fig.23]

- A1: position reference speed
- A2: moment of inertia ratio = 0 %
- A3: moment of inertia ratio = 1000 %
- A4: moment of inertia ratio = 300 %

[Fig.24]

- A1: position reference
- A2: speed reference
- A3: torque (thrust) reference
- A4: new torque (thrust) reference
- A5: predicted disturbance torque (thrust)
- A6: speed of motor

[Fig.25]

- A1: position reference speed
- A2: moment of inertia ratio = 0 %
- A3: moment of inertia ratio = 1000 %
- A4: moment of inertia ratio = 1500 %

[Fig.26]

- A1: position reference
- A2: speed reference
- A3: torque (thrust) reference

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A4: new torque (thrust) reference

A5: predicted disturbance torque (thrust)

A6: speed of motor

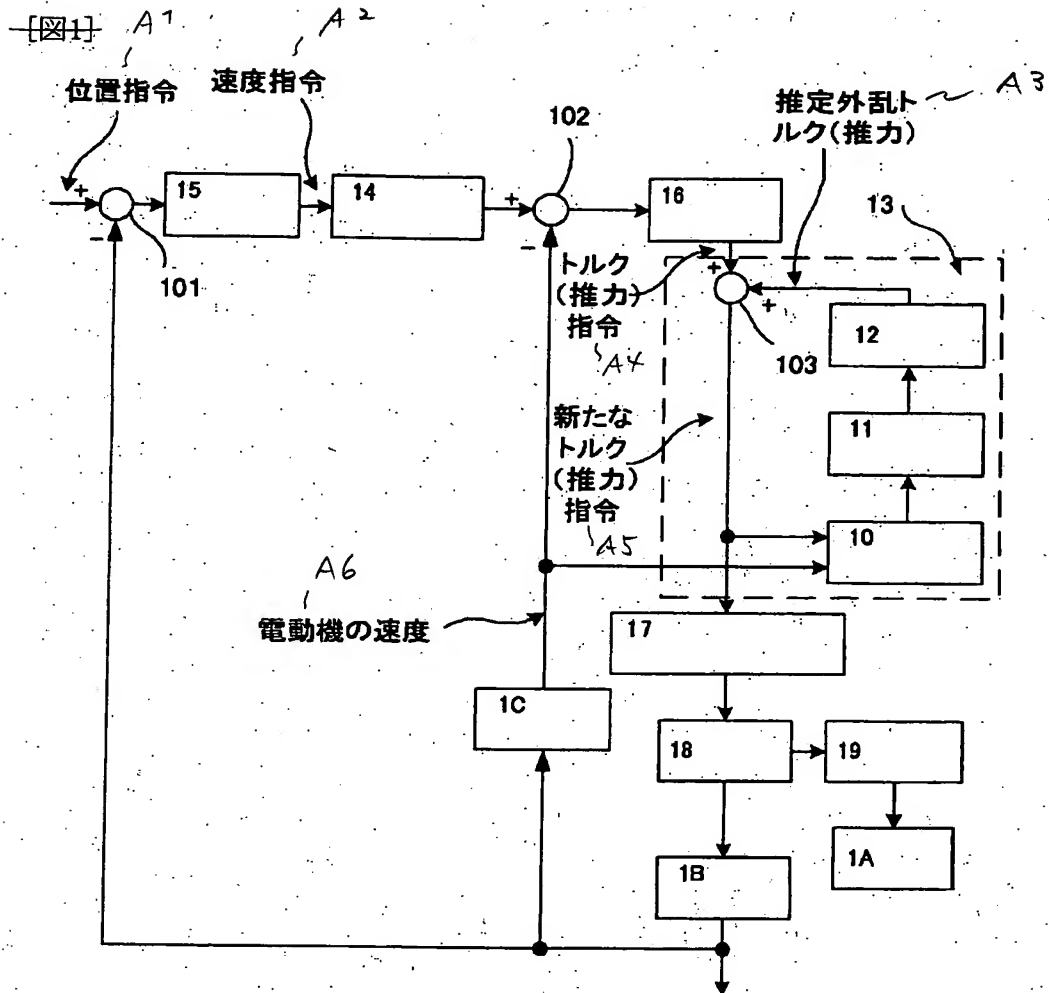
[Fig.27]

A1: position reference speed

A2: moment of inertia ratio = 0 %

A3: moment of inertia ratio = 1000 %

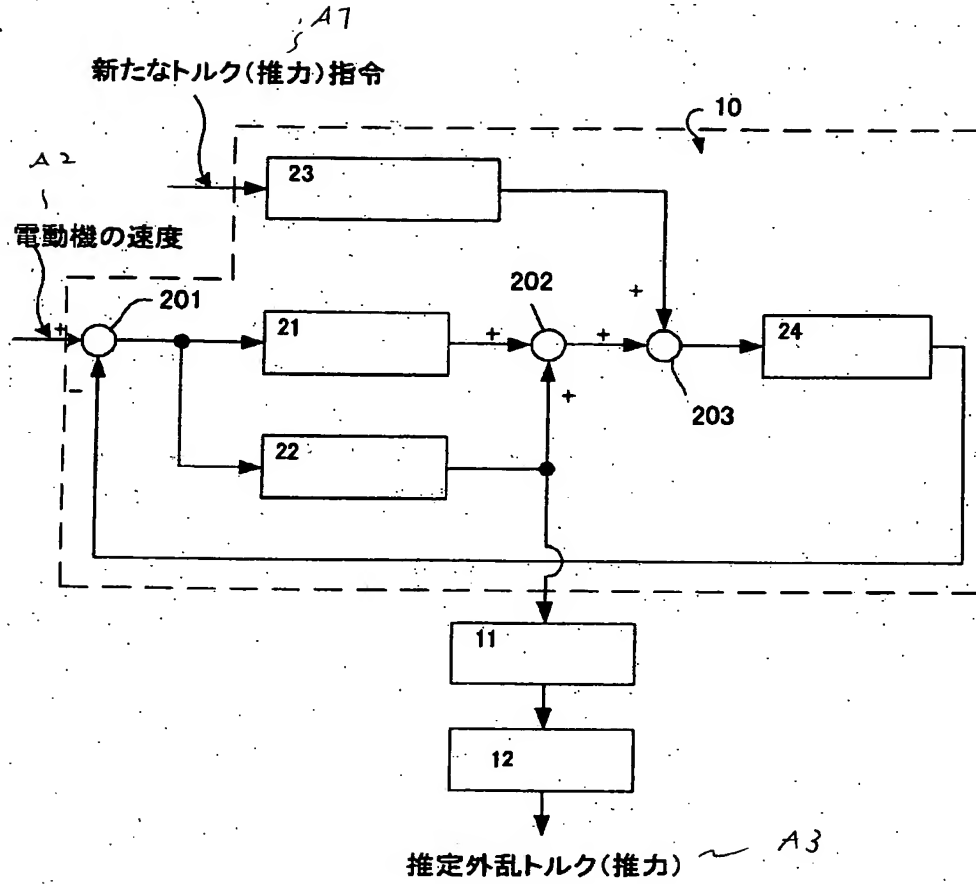
A4: moment of inertia ratio = 1500 %





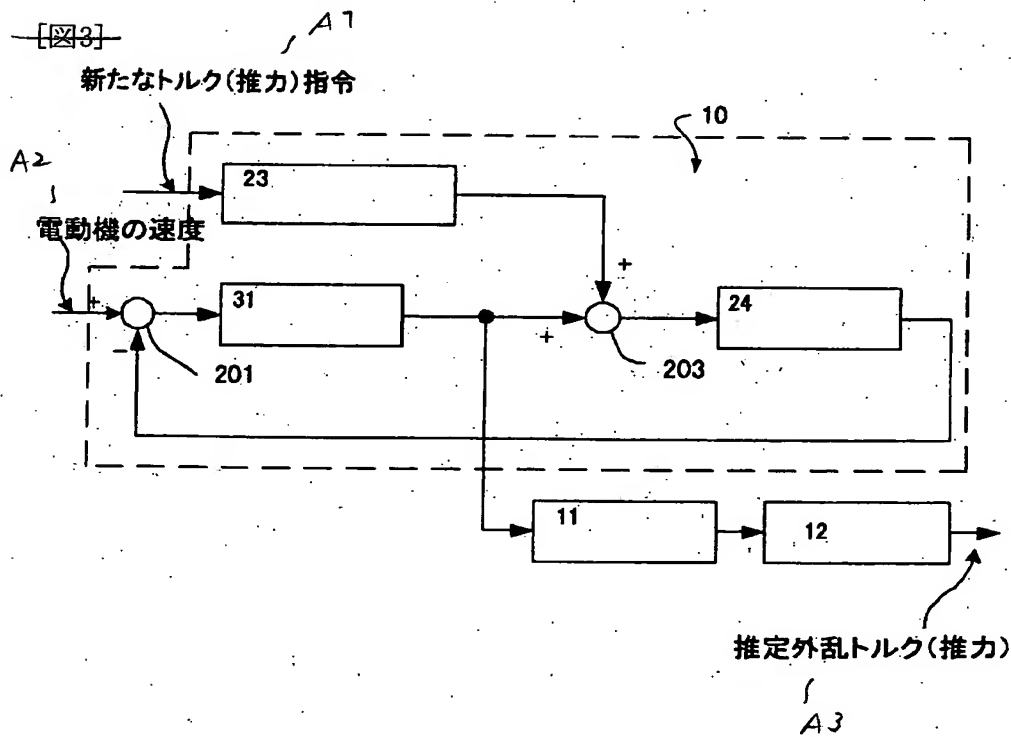
[図2]

Fig. 2



[図3]

Fig. 3



[図4]  
 Fig. 4

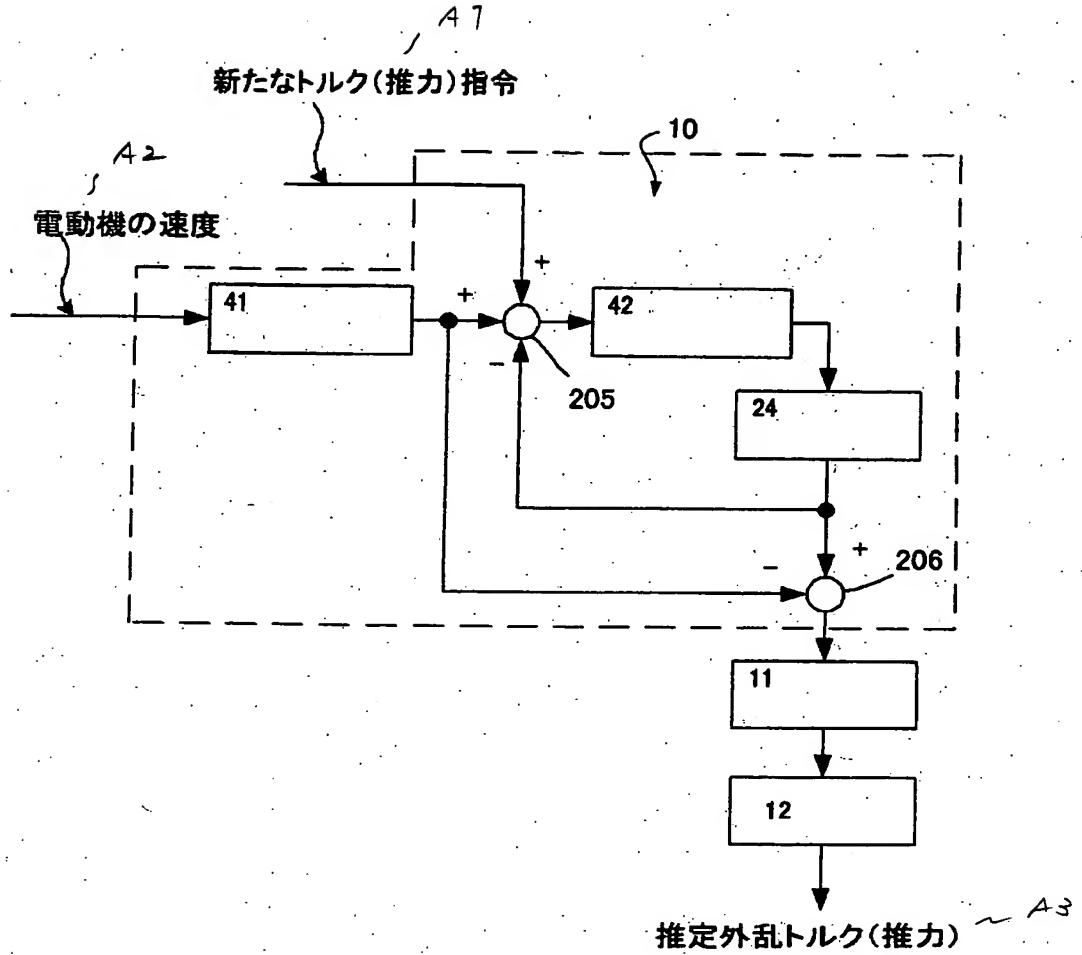
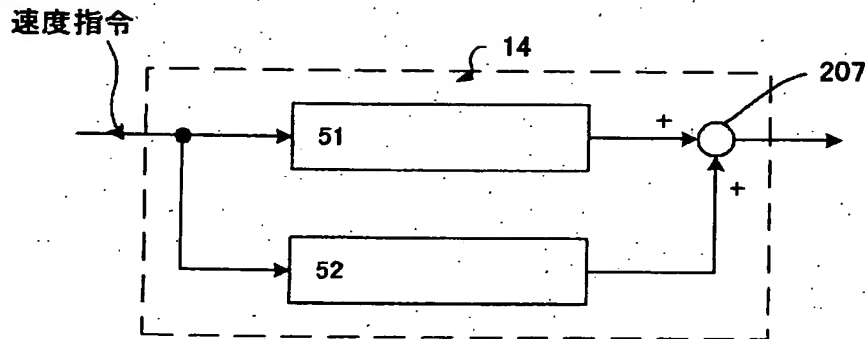


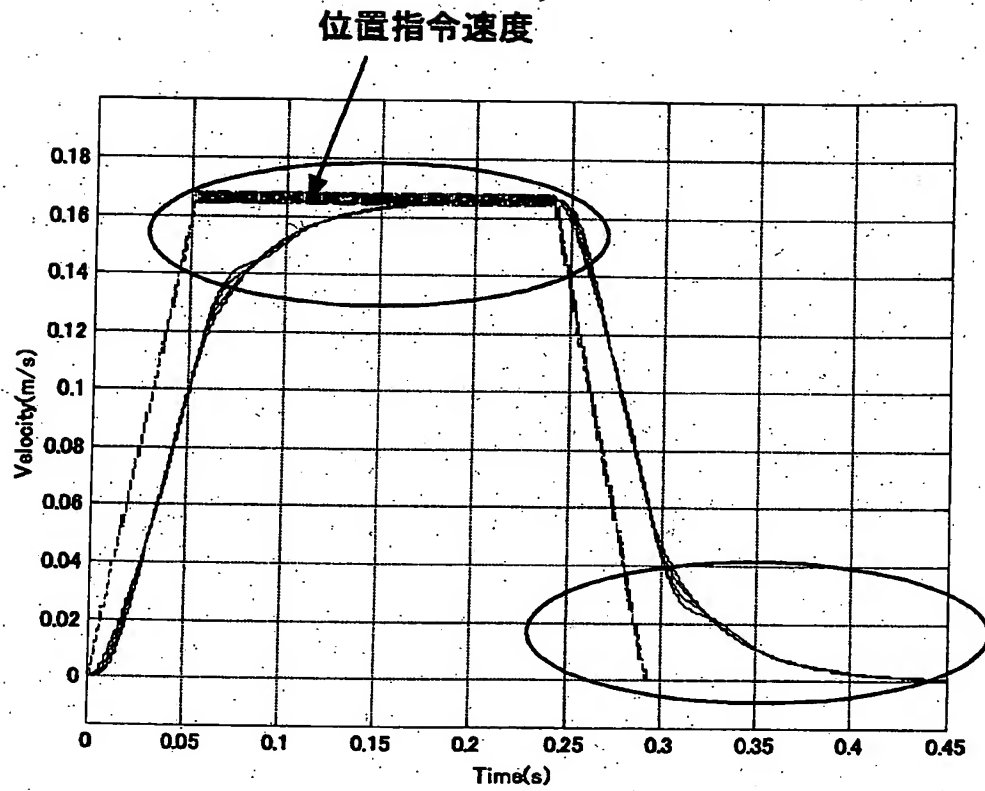
Fig. 5 [図5] A1



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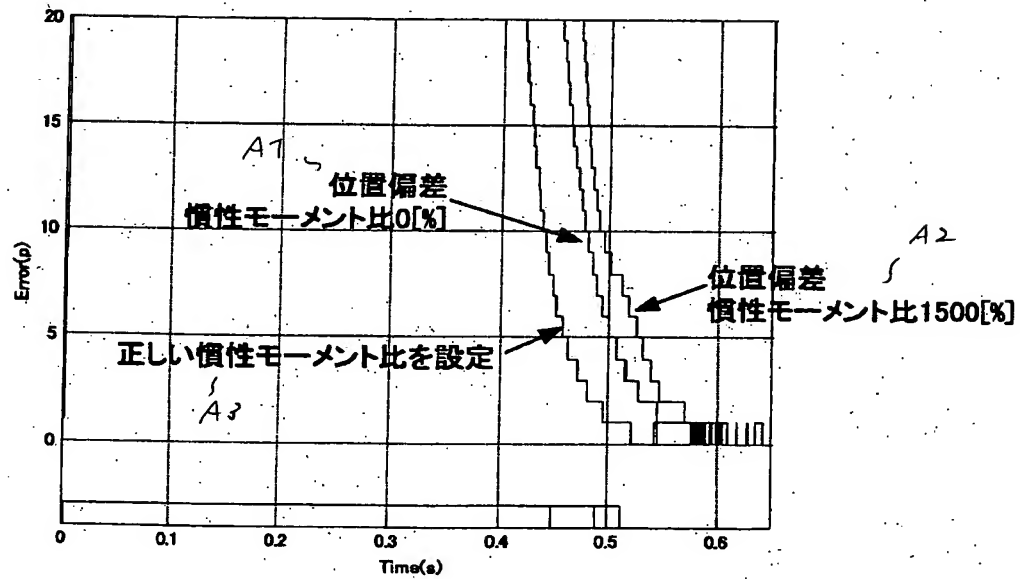
[[図6]]

Fig. 6



[[図7]]

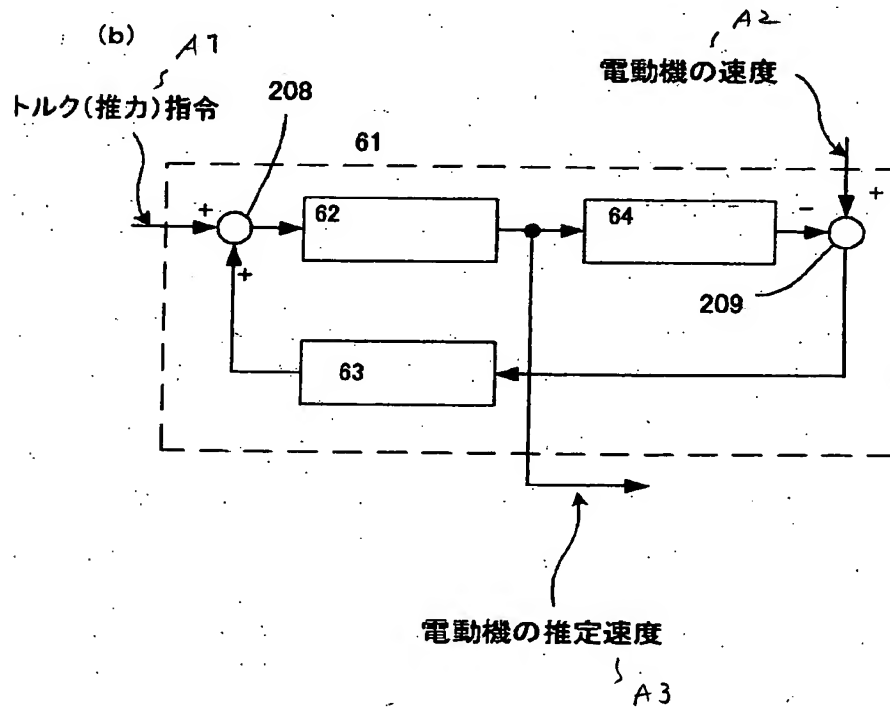
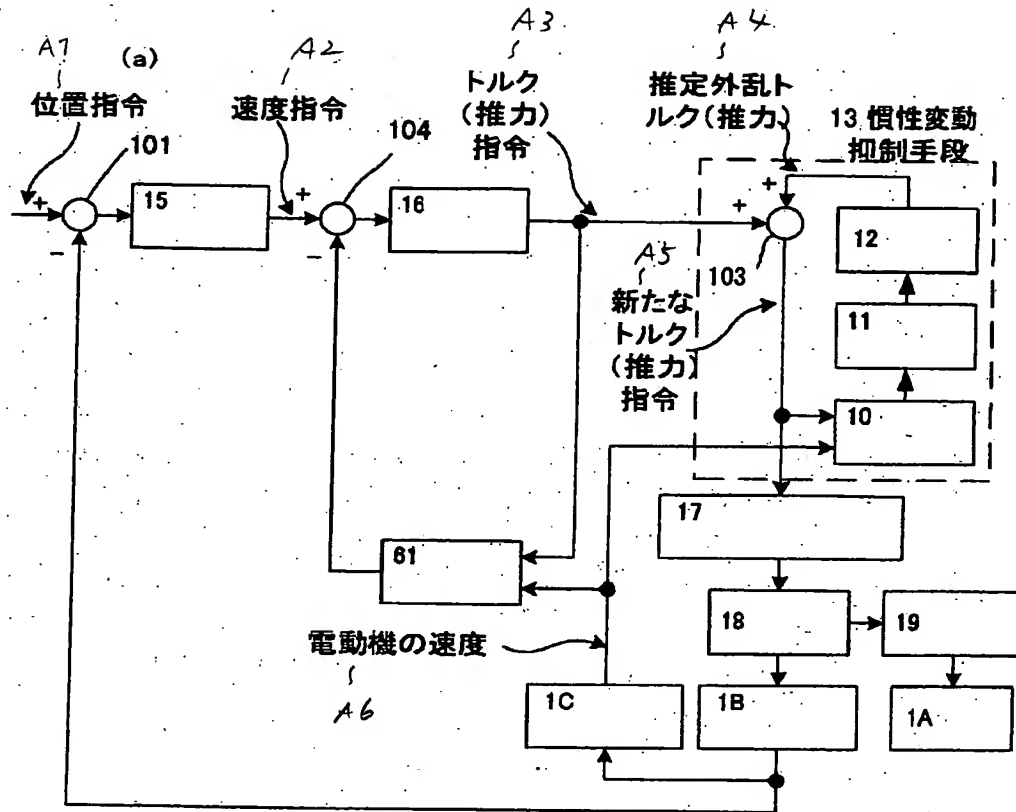
Fig. 7



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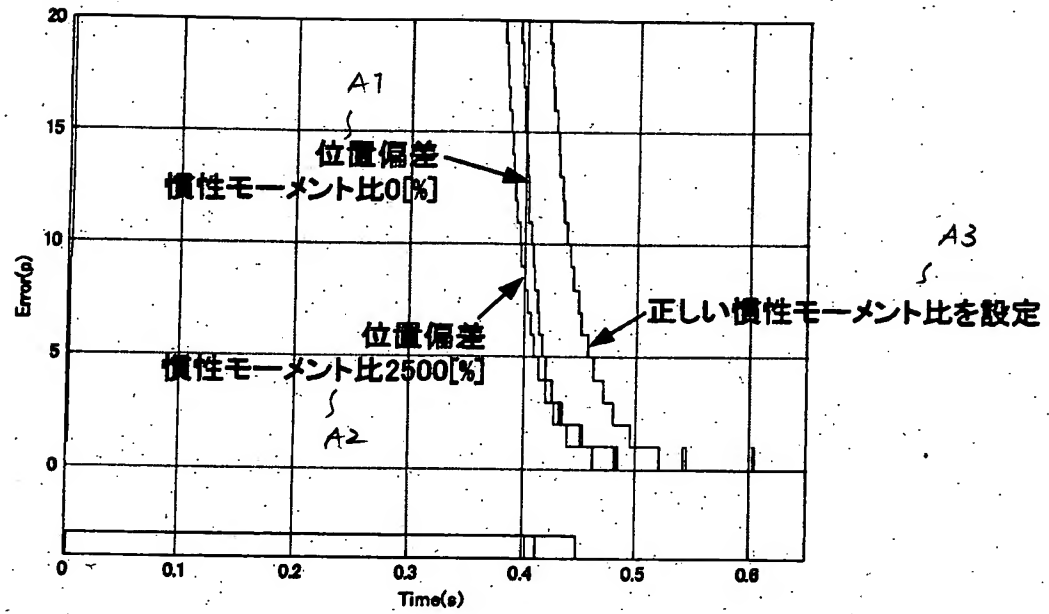
[図8]

Fig. 8



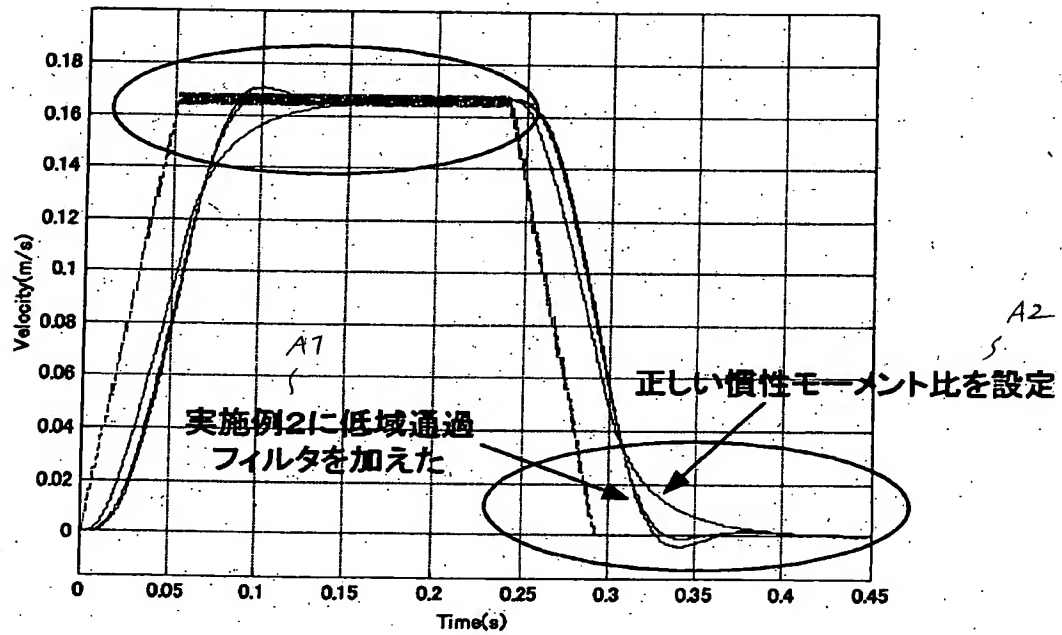
[図9]

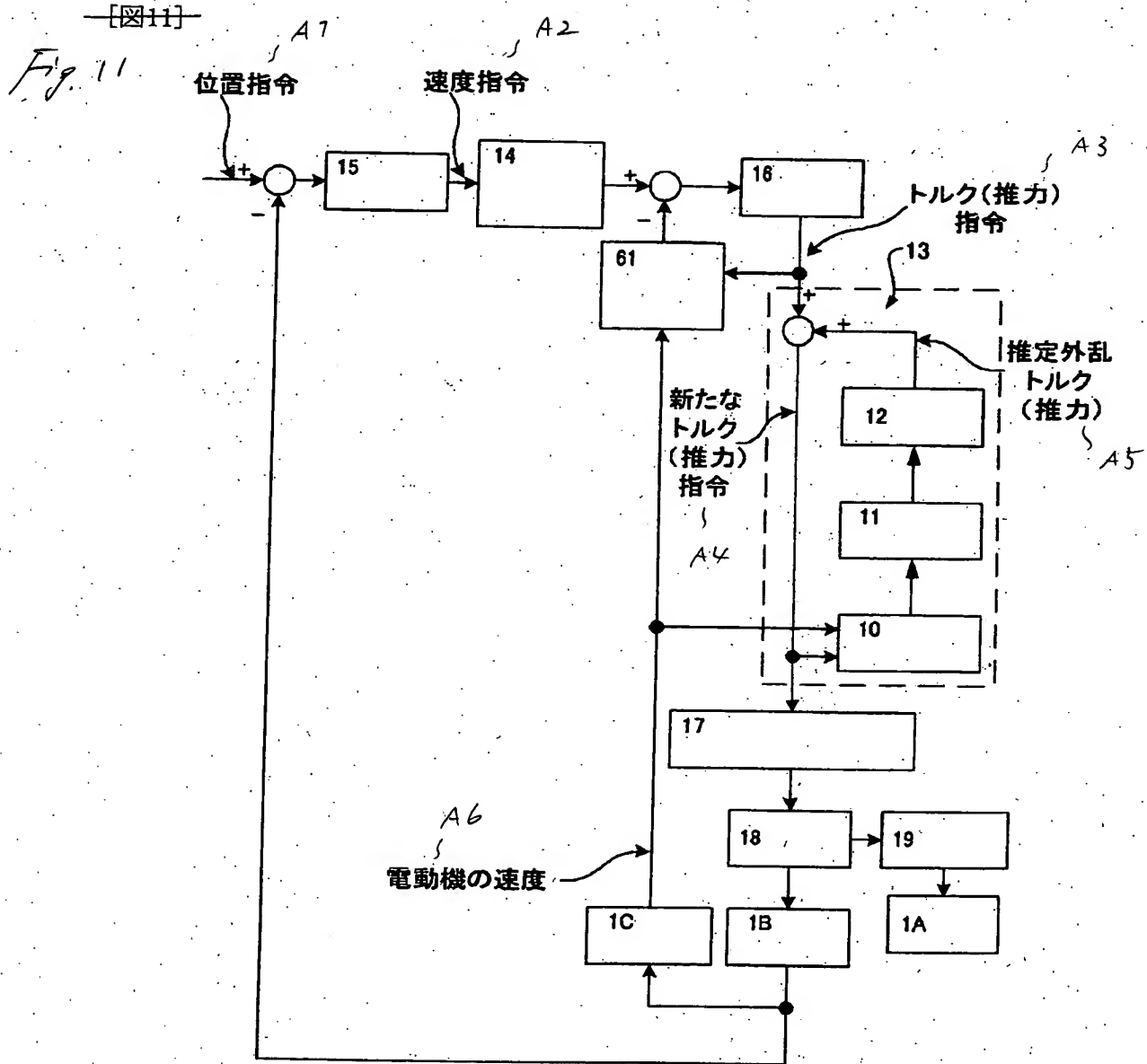
Fig. 9



[図10]

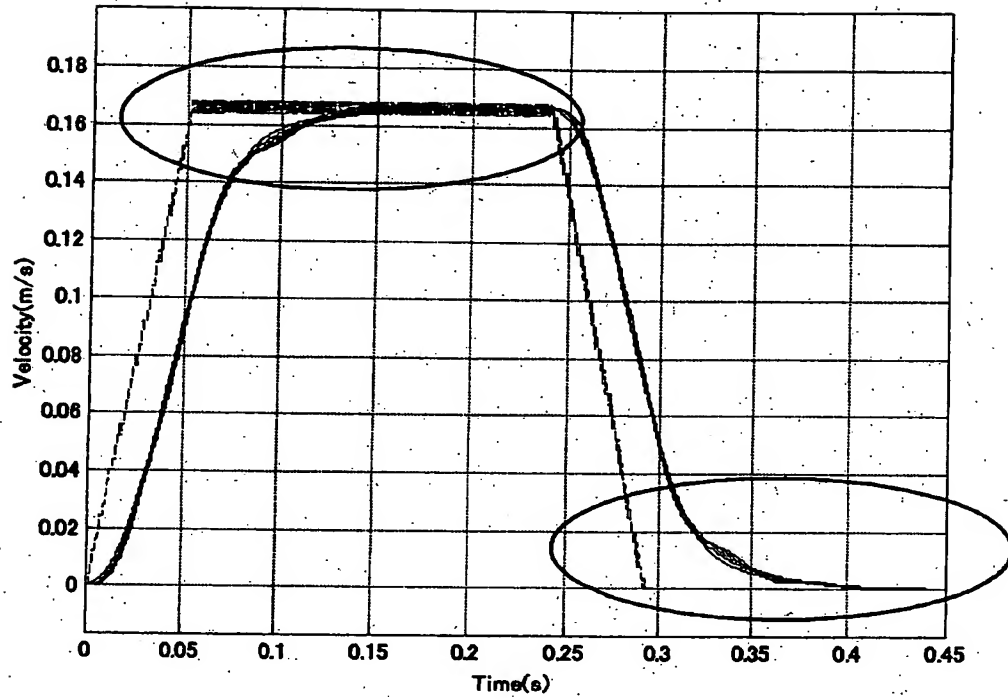
Fig. 10





[12]

Fig. 12

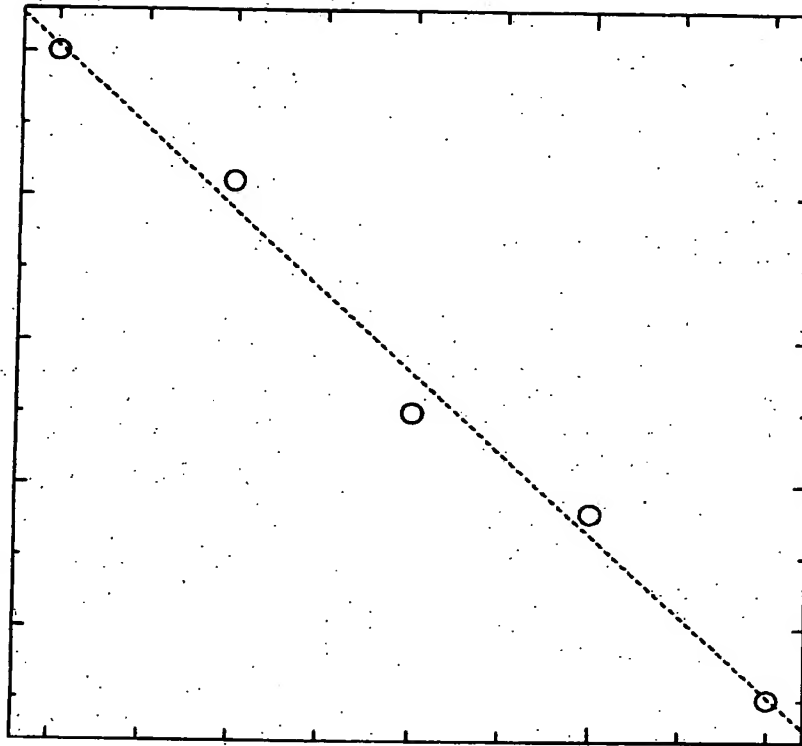


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[[図13]]

Fig. 13

速度オブザーバーのLPP時定数  
A2



速度ループゲイン  $K_v$

1  
A1



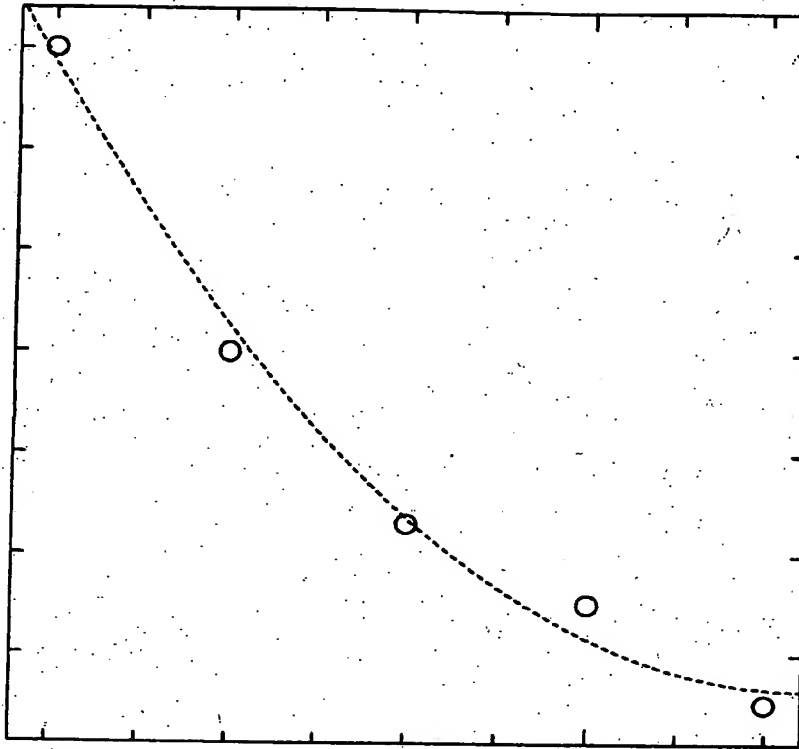
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[図14]

Fig 14

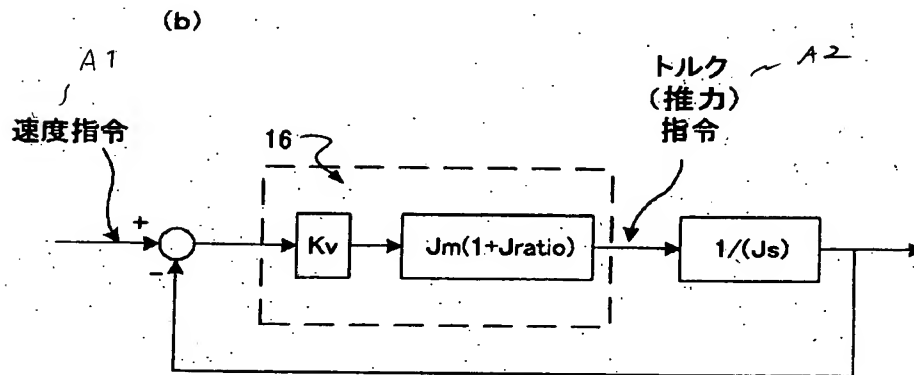
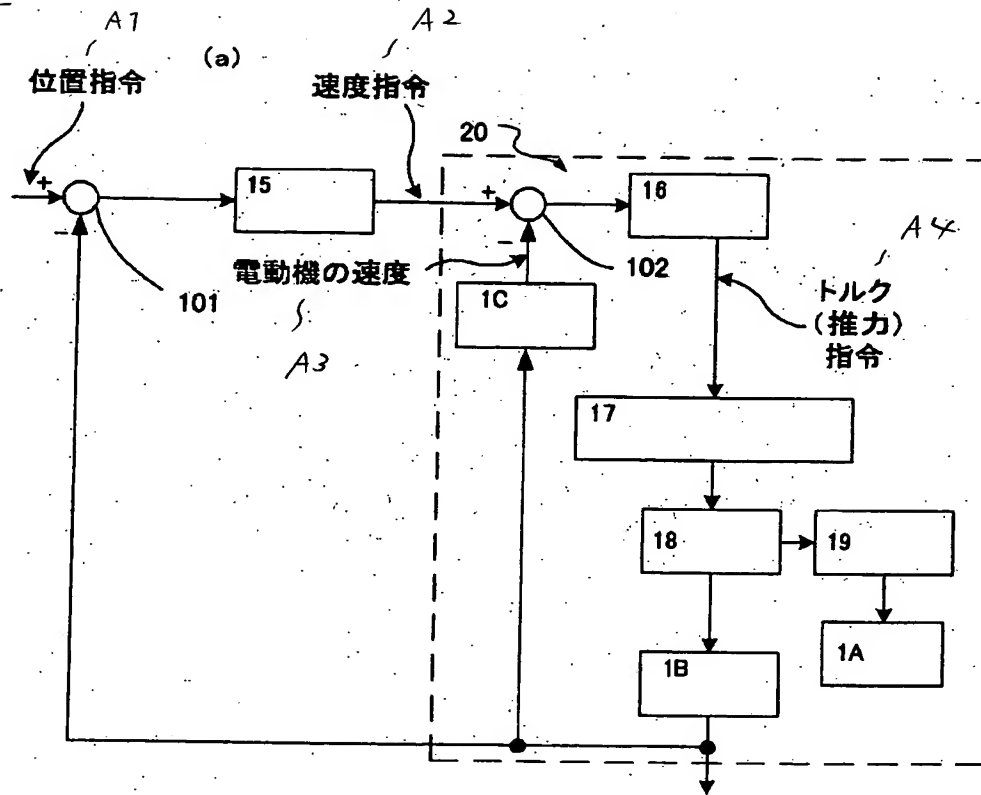
速度オブザーバのLPPF時定数  
A2



速度ループゲイン  $K_v$   
A1

[図15]

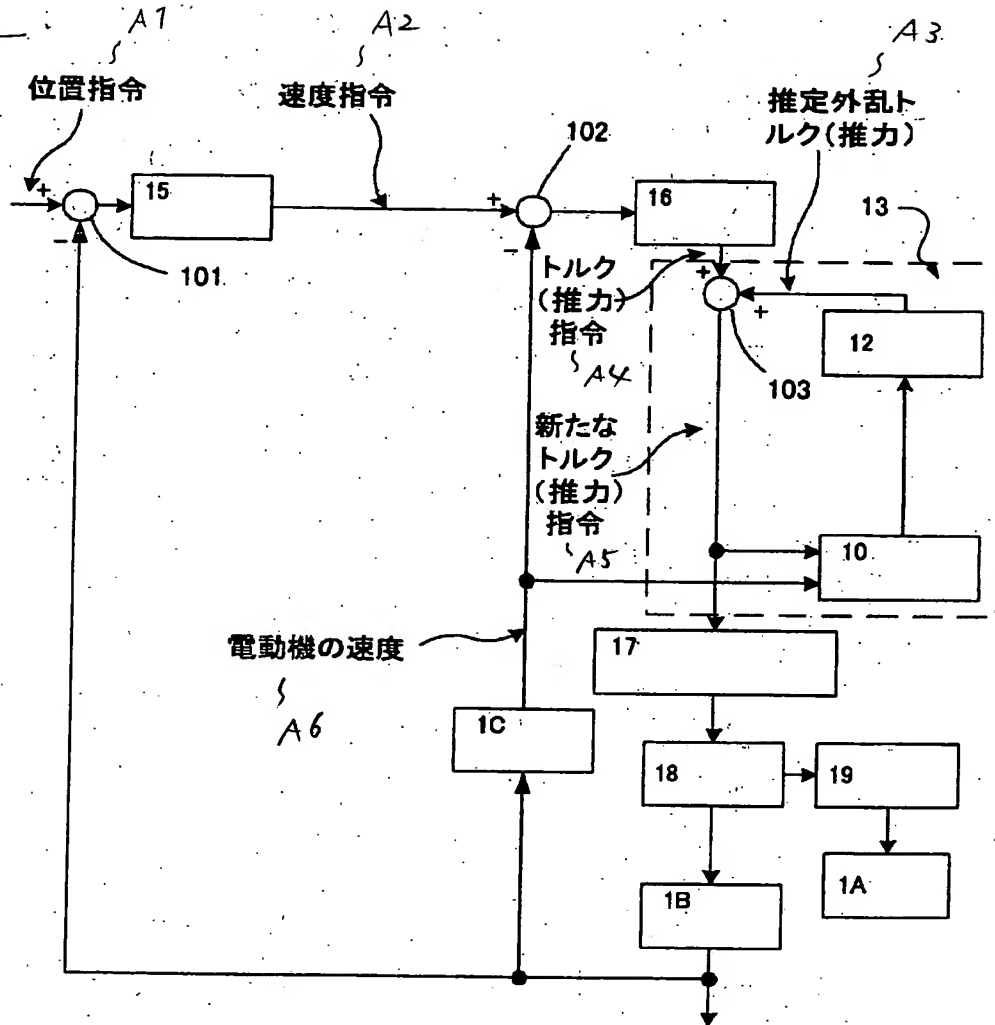
Fig. 15



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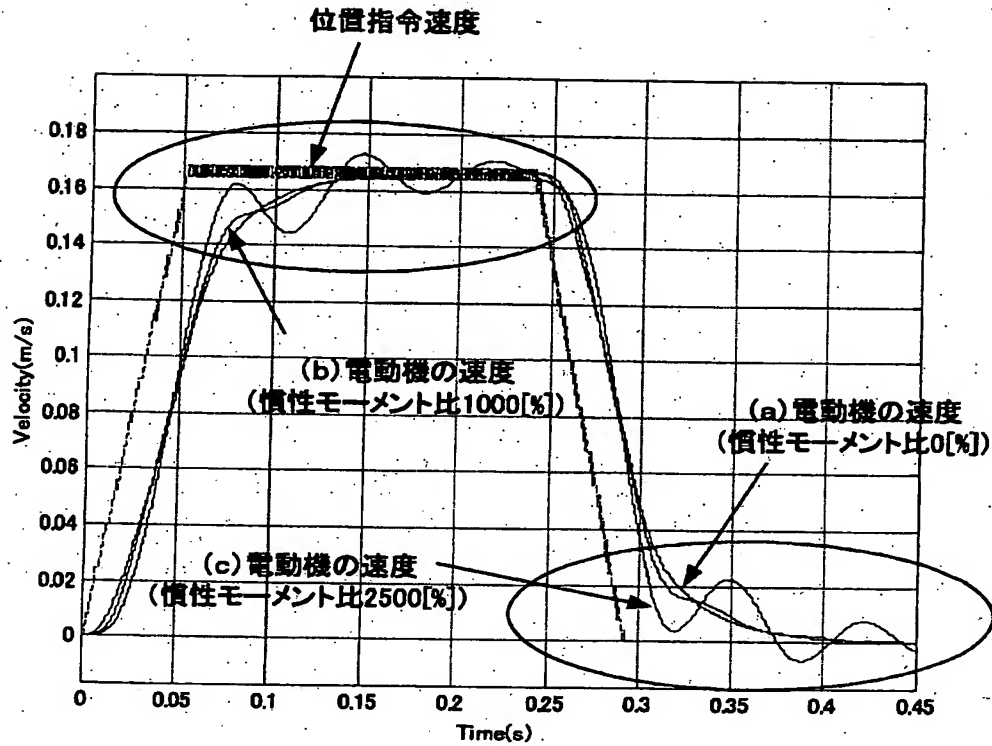
[図16]

Fig 16



[図17]

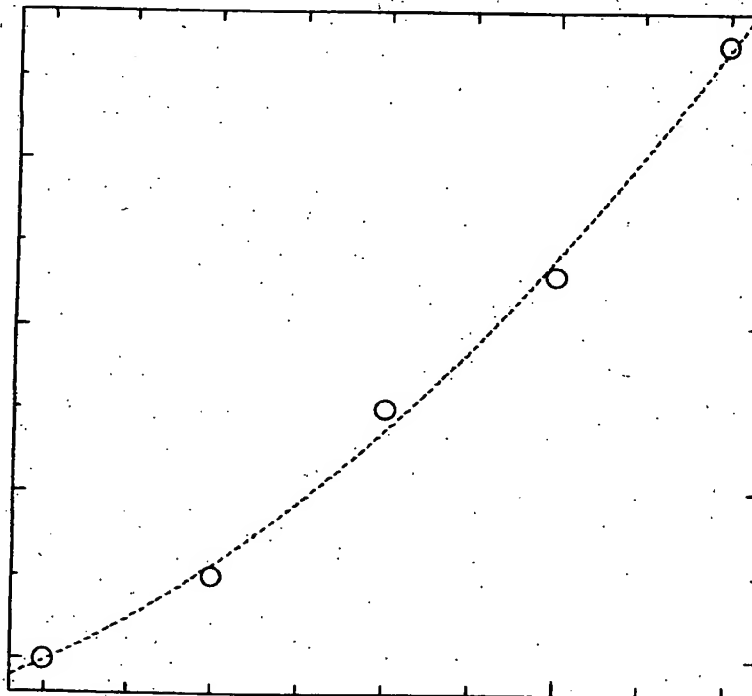
Fig. 17



[図18]

Fig. 18

位相進めフィルタ低域通過フィルタ遮断周波数

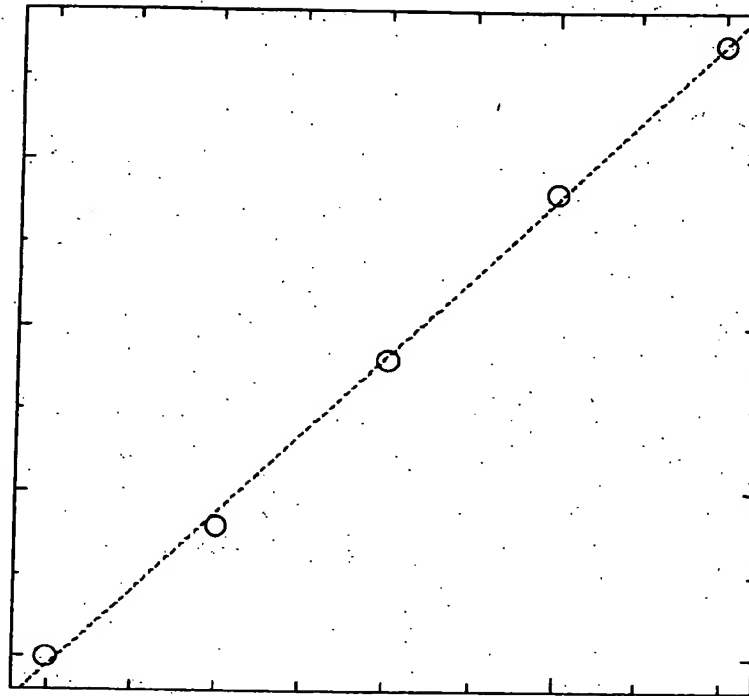


[図19]

Fig. 19

A2

位相進めフィルタ低域通過フィルタ遮断周波数

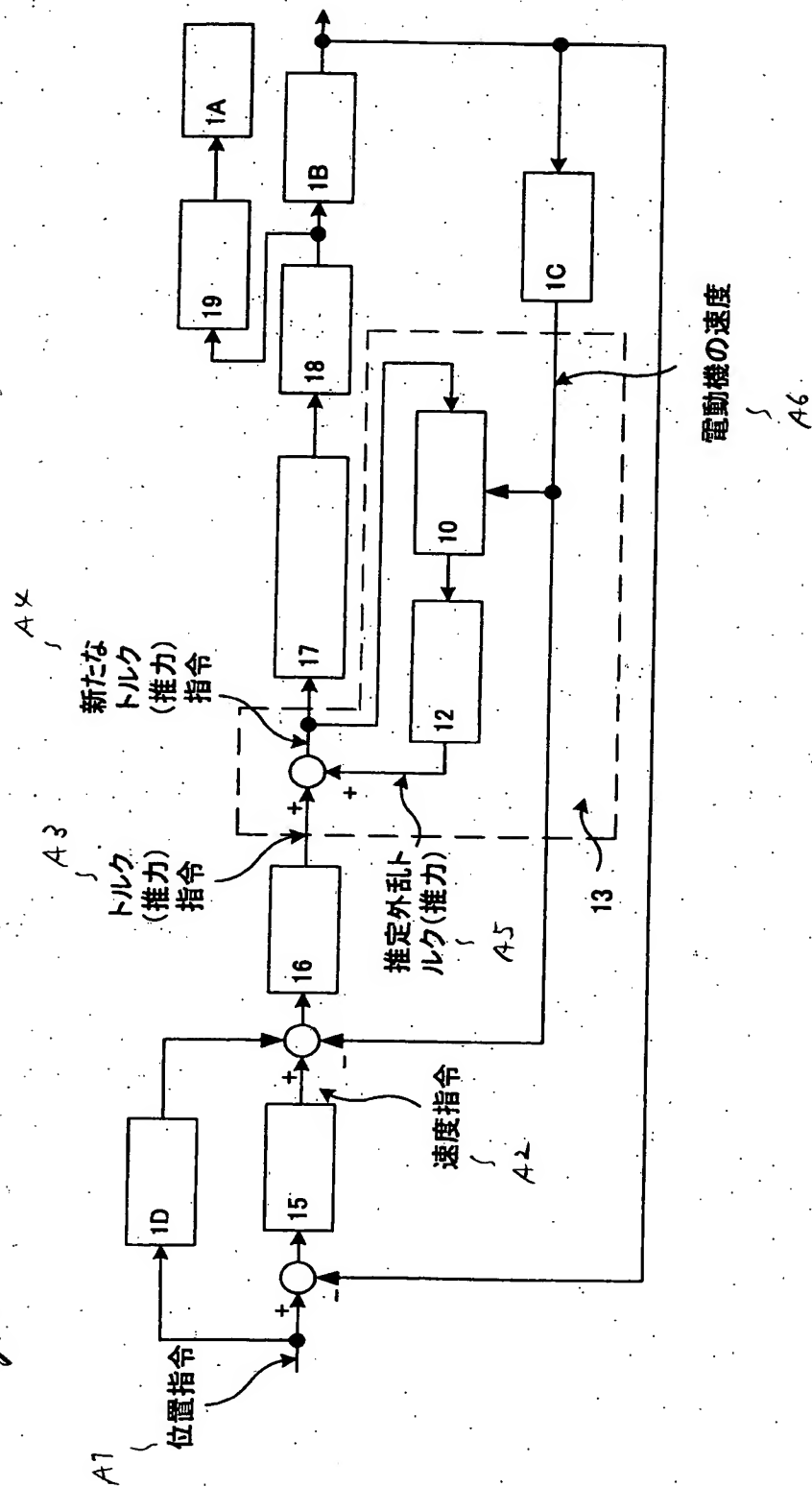


速度ループゲイン  $K_v$

}

A1

Fig. 20



[[図21]]

Fig 21

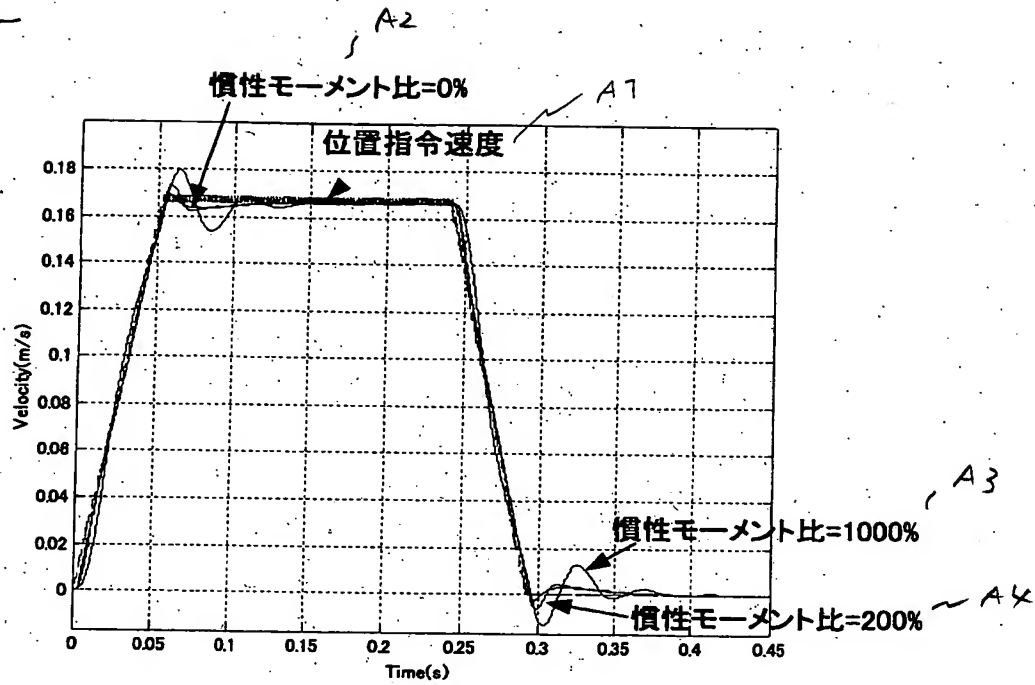


Fig. 22

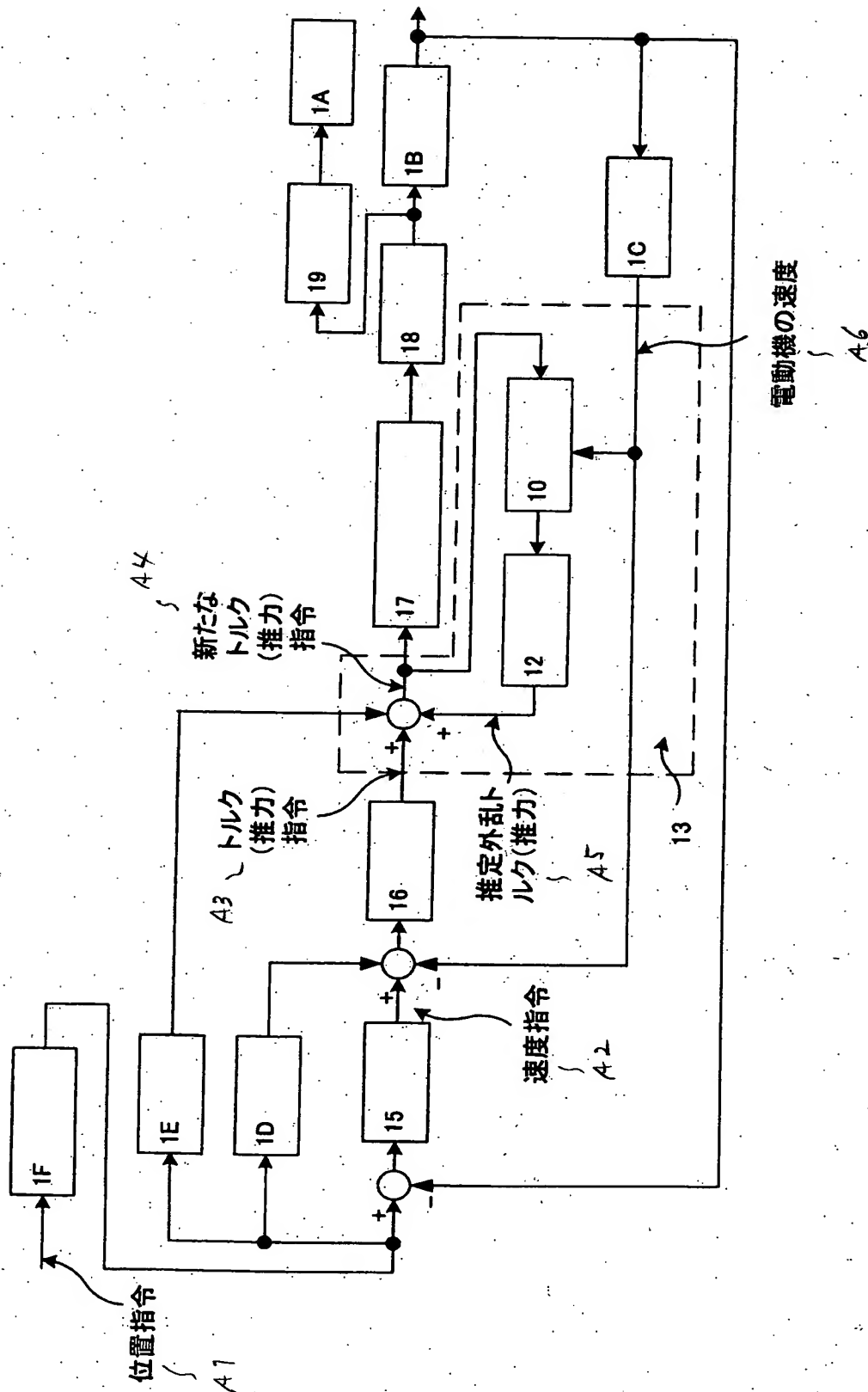




Fig. 13

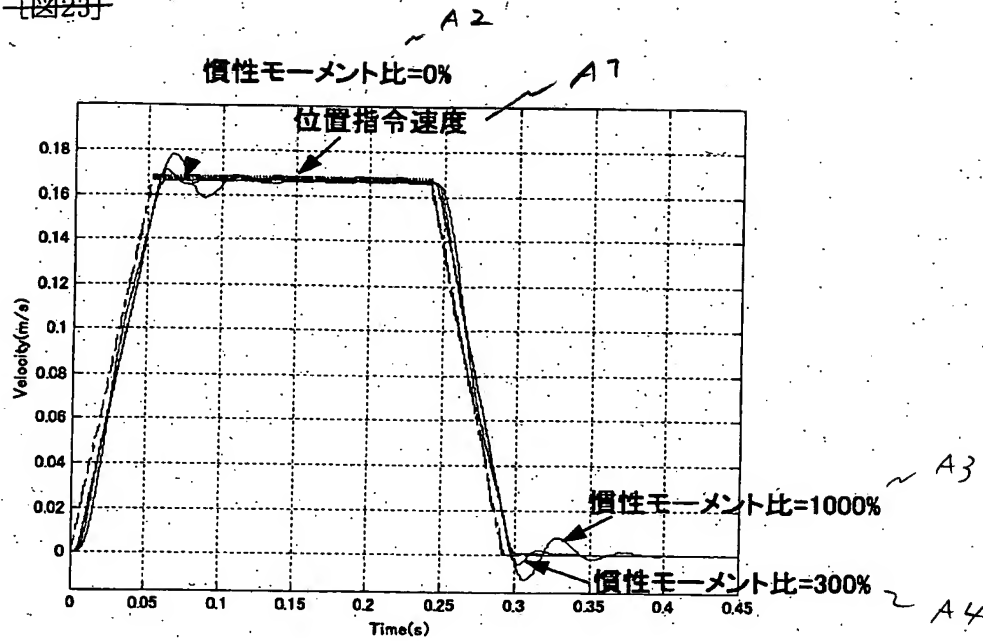
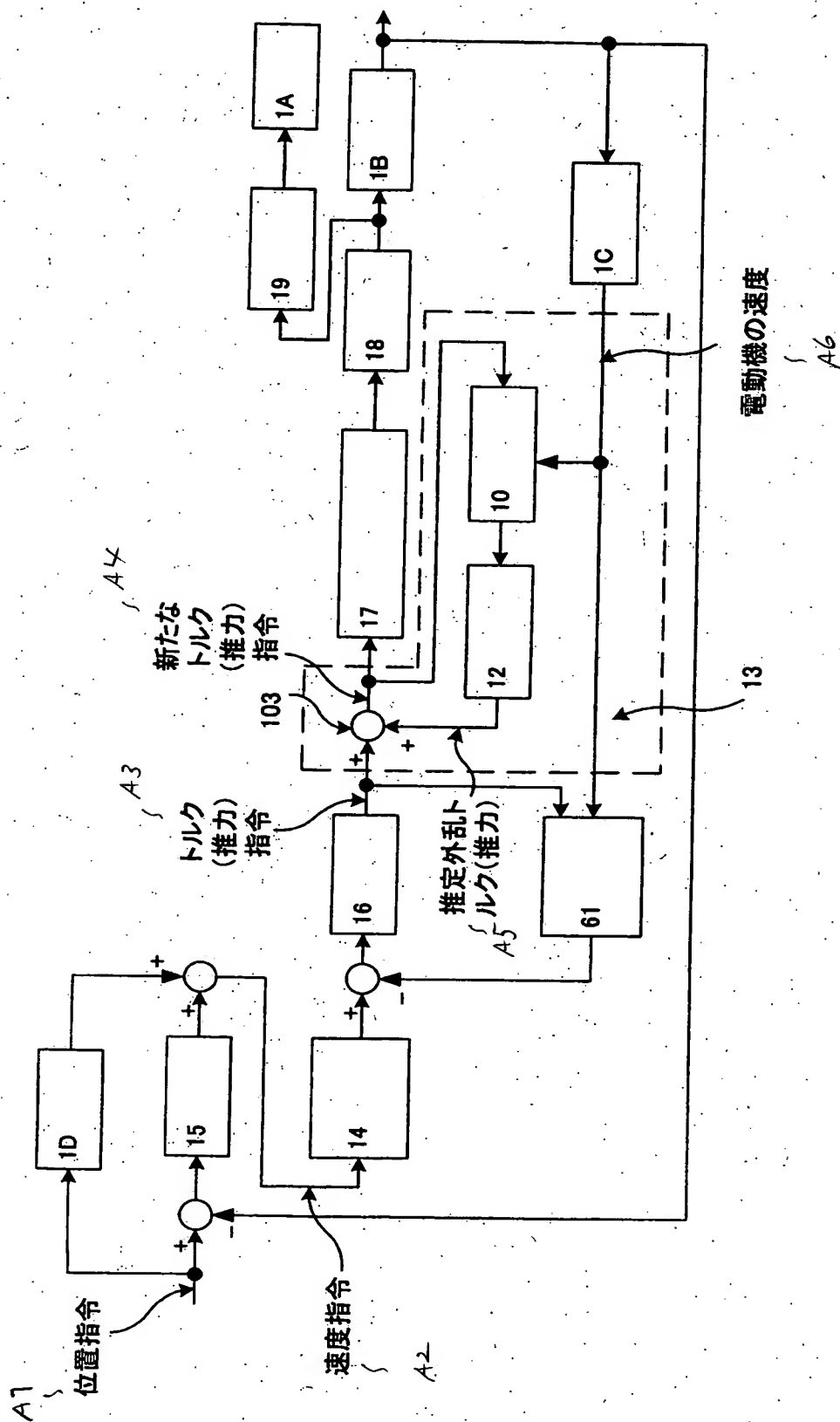
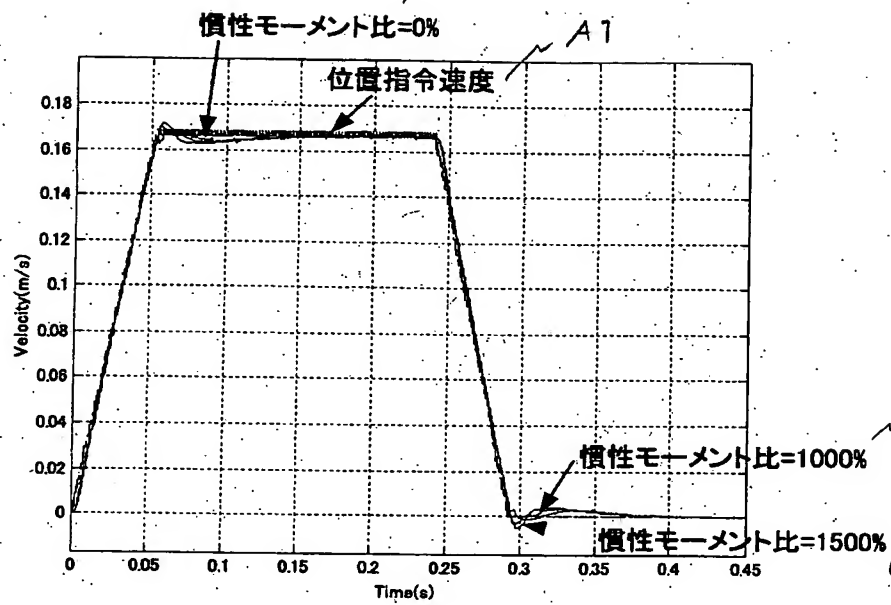


Fig. 24

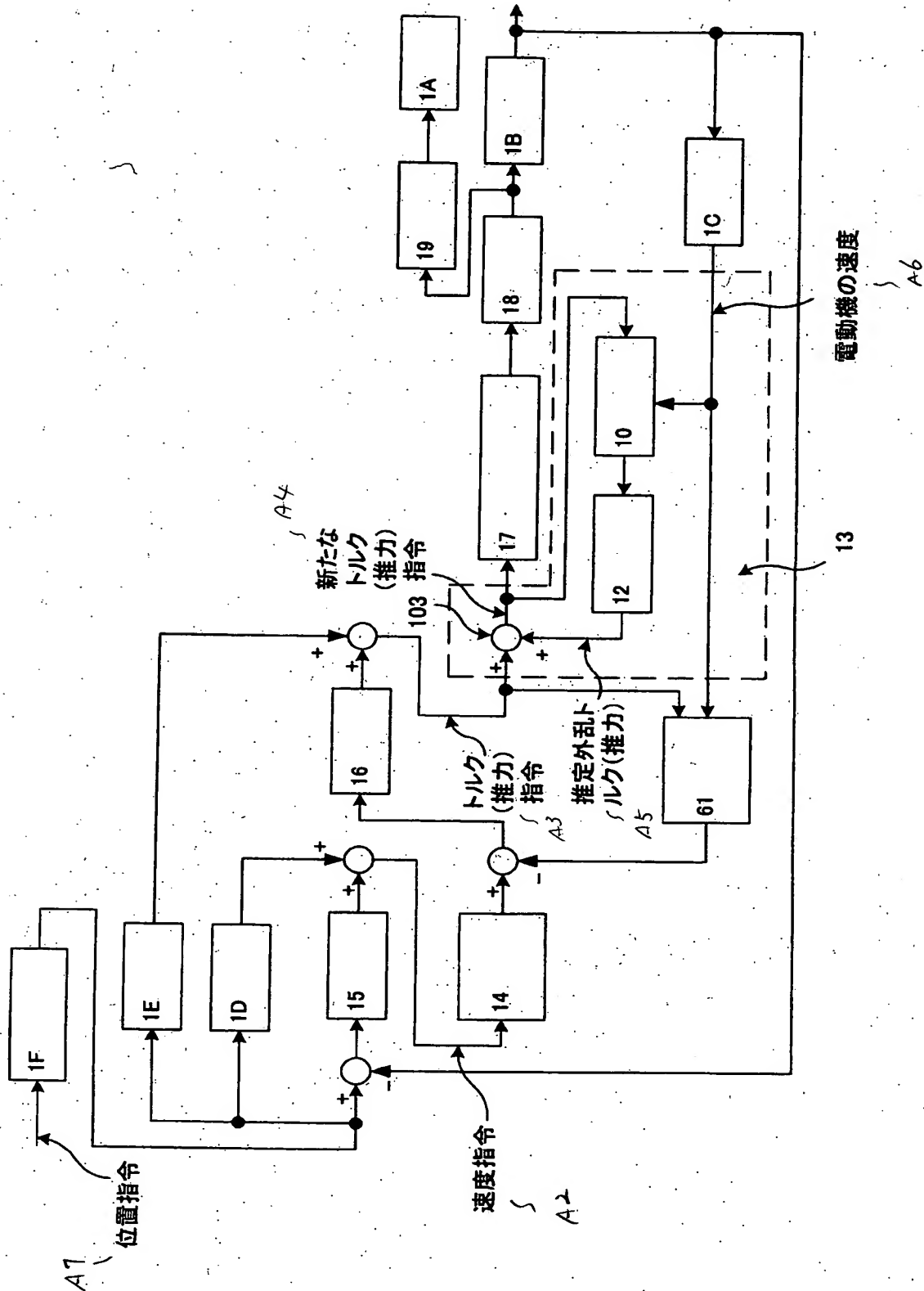


[図26]

Fig. 25

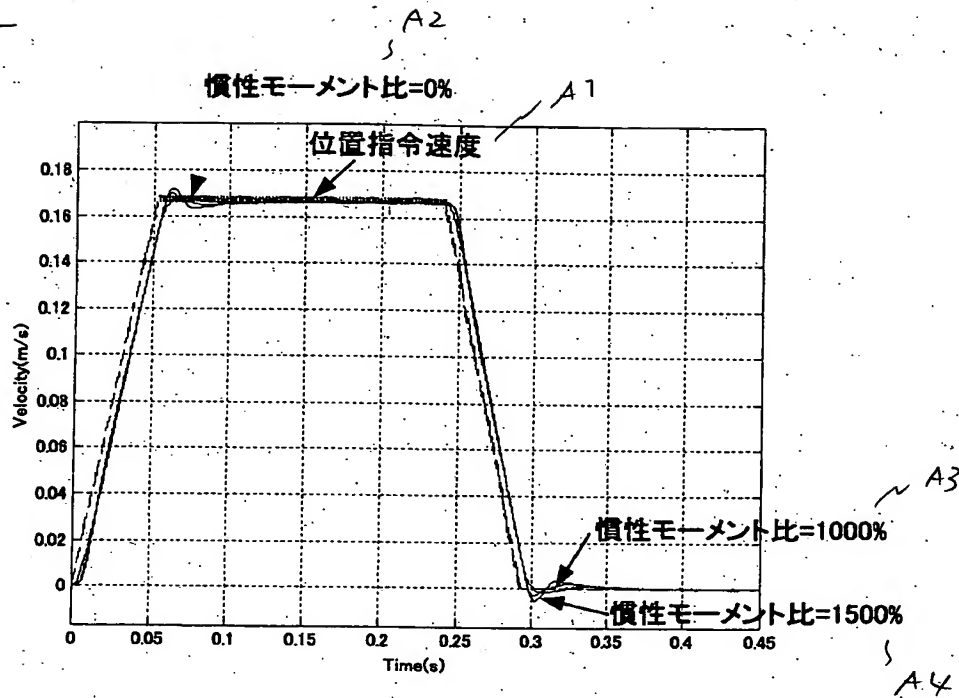


[~~図~~26]



[図27]

Fig. 27



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